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United States  
Department of  
Agriculture

Natural  
Resources  
Conservation  
Service

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## Part 612 Water Quality National Resource Economics Handbook

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# Chapter 1

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# Introduction

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## **612.0100 Purpose**

This document's purpose is to guide Natural Resources Conservation Service (NRCS), formerly Soil Conservation Service, personnel on the evaluation of economic benefits of measures that reduce water pollution from nonpoint sources. Exhibit A provides the policy basis for this part of the National Resource Economics Handbook (NREH). Economic analysis of nonpoint source control includes evaluation of offsite costs and benefits as well as those occurring onsite. Benefits from water quality improvements result from increased or more highly valued usage of the better quality water resources. Avoided damages and avoided mitigation expenses are also benefits.

This handbook is intended to be used with other Natural Resources Conservation Service references, such as the Field Office Technical Guide, National Watershed Manual, National Planning Procedures Handbook, Water Quality Field Guide, Water Quality Indicators Guide: Surface Waters, National Engineering Handbook, National Sociological Manual, Economics Handbook, and Agricultural Waste Management Field Handbook. It is meant to supplement the Water Resources Council Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies, generally referred to as Principles and Guidelines. The NTC technical notes referred to in this handbook are available in many state offices and from the NRCS National Office in Washington, DC. The Economics Handbook cited throughout this part of the NREH is in draft and copies of the parts cited are available in most state offices and at the NRCS National Office.

Related technical guidance is in Midwest NTC Technical Note 190-L1-5, Project Planning for Water Quality (December 1987); Tech Release S8, General Guidelines for the Assessment of Water Quality (June 1976); and SNTC Technical Note 1706, Project Planning for Water Quality Concerns (November 1992).

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## **612.0101 Scope**

This handbook addresses economic benefits of measures that reduce water pollution from nonpoint sources. The treatment of risk is discussed, but comprehensive risk analysis guidelines are beyond this guide's scope. Land treatment and other conservation measures cost computations are covered in the draft of Part 630, Watershed Planning, Economics Handbook, and in the National Watershed Manual.

## **612.0102 Evaluation criteria**

### **(a) Benefit-cost analysis**

The first issue in analyzing benefits of nonpoint source pollution control is to link source control to resulting benefits (cause and effect). The value of source control can be estimated only in relation to impacts having benefits or reducing damages. Modeling the linkages to benefits involves several disciplines, such as hydrology, geology, soil science, environmental science and engineering, and biology. This interdisciplinary process and the economist's part in it are described further in Chapter 3, Quantifiable Impacts.

When impacts are traced, the value of pollutant reduction differs greatly depending on proximity to a water body, alternative uses of the affected water, and time lags before the benefits occur. It is incorrect to assign the same dollar value per ton of reduced pollutant if the impacts per ton differ.

The second issue in analyzing benefits of nonpoint source pollution control is quantifying benefits. Consumer and producer surplus provide the conceptual basis for measuring economic benefits.

In many cases the benefits estimates are uncertain. The uncertainties should be reported.

The impacts of a project having water quality effects are displayed in the context of the four accounts: National Economic Development (NED), Environmental Quality (EQ), Regional Economic Development (RED), and Other Social Effects (OSE). When economic estimates of environmental quality impacts are available and of sufficient quality, they are customarily reported in the NED account. Section 1.7 of Principles and Guidelines describes in which account various types of impacts should be reported.

Benefit-cost analysis requires accounting for the time value of money. It also shows the benefits and costs for each year of project life, the net present value, and the average annual equivalent. (See the draft section 620.30, Economics Handbook, or a text such as Gittinger 1982.)

### **(b) Cost-effectiveness analysis**

Sometimes benefits cannot be expressed in monetary terms. If the same benefits are produced by each alternative, then cost-effectiveness analysis is acceptable. For example, if the goal is to protect X amount of eagle habitat, the plan that protects X amount of eagle habitat at the lowest overall cost should be chosen.

Exhibit B in this part of the NREH gives an example of least cost analysis to choose between resource management systems. The draft Part 622, Conservation Options Procedure Example, of the Economics Handbook demonstrates the use of cost-effectiveness analysis to evaluate resource conservation options.

### **(c) Threshold levels**

Water quality is defined in terms of its fitness for particular uses (fishable, swimmable). Overly high levels of some contaminants prohibit some uses. The level of a contaminant that, if exceeded, precludes a particular use is the contaminant's threshold level for that use. Threshold levels also apply to parameters other than contaminants, such as water temperature.

An example of threshold levels would be if high fecal coliform counts closed a stream to water contact recreation. The least cost combination of practices that would reduce fecal coliform levels to an acceptable level could consist of an animal waste management system, buffer strips, and fencing and pasture improvements. No water contact recreation benefits occur until the pollutant is reduced to or below the threshold limit.

An exception on how to treat threshold levels occurs in big basin problems if a package of projects will bring the system up to the needed quality. In that case one assigns a share of eventual benefits to each project that is part of the larger clean-up effort. For example, if a project on Watershed A contributes 10 percent of the reduction in pollutants that a system of projects will achieve, it would be acceptable to assign it 10 percent of the benefits from the overall cleanup plan.

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**(d) Planning steps**

Water quality problems should be approached with the planning steps outlined in the National Planning Procedures Handbook (Part 600.2). The future projected with the project should be compared to the future projected without the project. Midwest NTC Technical Note, Project Planning for Water Quality, Series 190-LI-5 (December 1987) and the South NTC Technical Note 1706, Project Planning for Water Quality Concerns (November 1992) give further information.